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Thermo-hygrometers

User's manual

Version
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1.Product versions

	Cod.			
Power supply *Output*	24 V≈ Analog*	12 V= Analog*	10-14 V = Pt100	10-14 V = 0÷300mV
Description				
Temperature and relative humidity sensor, suitable for LSI-LASTEM data acquisition systems. Cable L. 5 m attached.Coupled to natural (DYA230) or forced ventilation (DYA231, DYA232) antiradiant shield			DMA572	DMA572.1
Temperature and relative humidity sensor with analogue output, complete with natural ventilation anti-radiant shield.	DMA585	DMA575		
Temperature and relative humidity sensor with analogue output, complete with forced ventilation anti-radiant shield	DMA569	DMA567		

2.Description

2.1.Main features

- Thermohygrometric sensitive element easily replaceable, even by unskilled person;
- Natural or forced ventilation anti-radiant shield;
- Relative humidity or dew point measurement;
- Highly-reflective anti-radiant shield;
- Analogic standard output (0/4÷20 mA, 0÷1/5 Vcc, 0/60÷300 mVcc) or LSI Lastem acquisition systems suitable output.

2.2.Models

DMA572 is the sensor represented in the nearby picture.
Temperature sensitive element is a thermoresistance Pt100 type, the humidity sensitive element is a capacitive plate. One of the most important improvement of this line of sensors is the mounting of the sensitive element: the transducers are supplied in an interchangeable capsule, avoinding all the calibration processes. For metereological application DMA572 must be equipped with anti-radiant shield DYA230 (natural ventilation), DYA231, DYA232(forced ventilated).

DMA575 and DMA585 are provided with antiradiant shield with natural ventilation. They have locally programmable analogical output 0/4÷20mA, 0/1÷5V, 0/60÷300mV (default 4÷20mA).
DMA575 has 12V= power supply, DMA585 has 24V≈ power supply.

DMA567 and DMA569 are provided with forced ventilation antiradiant shield
They have locally programmable analogical output 0/4÷20mA, 0/1÷5V, 0/60÷300mV (default 4÷20mA).
DMA567 has 12V= power supply, DMA569 has 24V≈ power supply.

3.Technical specifications

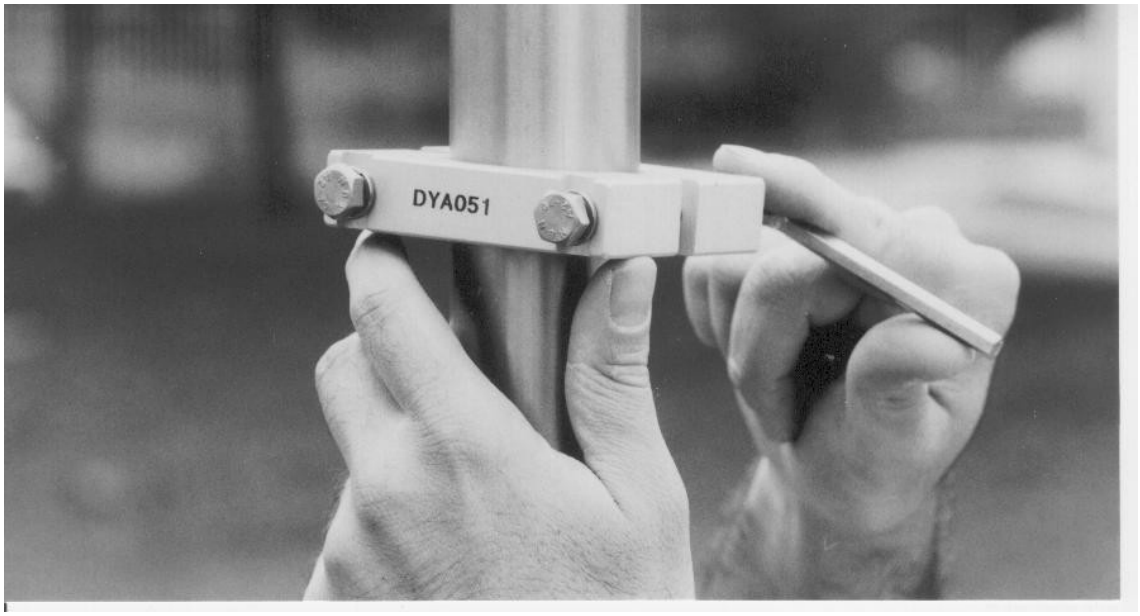
	Temperature	Relative humidity
Range	-30 ÷ 70 °C, -50 ÷ 50 °C, 0 ÷ 100 °C, -40 ÷ 100°C	0 ÷ 100 %
Sensitive element	Pt 100 1/3 DIN-B	Capacitive
Sensitive element replacement	ML3021 Plug-in connector	
Sensitive element accuracy (Repeatability + Hysteresis)	±0,2 °C (0 °C)	1,5% (5 ÷95%, 23 °C)* 2%(<5, >95%, 23 °C)*
Electronic Accuracy	± 0,035 °C	± 0,25 %
Resolution (sensitive element)	0,035 °C	0,25 %
Response time (Sensitive element)	10s	---
Long term stability	n.a.	< 1% year
Temperature dependence (6 ÷45 °C / 11 ÷90% RH)	n.a.	Max ± 1,5%
Operating temperature	-40 ÷95 °C	
Output	DMA567-DMA569 - DMA575 – DMA585: analog DMA572: Pt100 (Ω)	DMA567-DMA569 - DMA575 – DMA585: analog DMA572: 0 ÷300 mV DMA572.1: 0 ÷1 V
Power Supply	DMA567 - DMA572 - DMA575: 10 ÷14 Vdc DMA569 - DMA585: 24 Vac	
Power Consumption	DMA567-DMA569 -DMA575 – DMA585 (fan not inclueded): max 1,5 W DMA572: 2mA	
CE Compliance	EMC EN 61326-1 2006	
Electric Protection	Tranzorb on output and power supply	
Housing	plastic and alluminium	
Weight	DMA567...DME785: 1900 g max DMA572: 440g	
Connection Cable	DMA572: 5m (attached) DMA575 – DMA585: Mod. DWA5…(6 wire + shield)	

4.Assembly instructions

Select a site with conditions representative of the environment being examined. Hygrothermometers-Thermometers must be assembled in places where the morphological conditions of the earth, the urban structures and the environmental conditions in general make them particularly representative of the general conditions in which the measurement is to be performed.
It is important that there are no structures in the nearby areas which might radiate heat, such as cement floors, asphalt, walls, etc. The thermohygrometer should be installed at 1,5 - 2 mt from the ground (see WMO n° 8 part 2).

4.1.Mounting

Place the supporting collar DYA051 in position on the pole at the desired height (normally 1,5 - 2 m.) and tighten the screws (socket head screw no. 6).



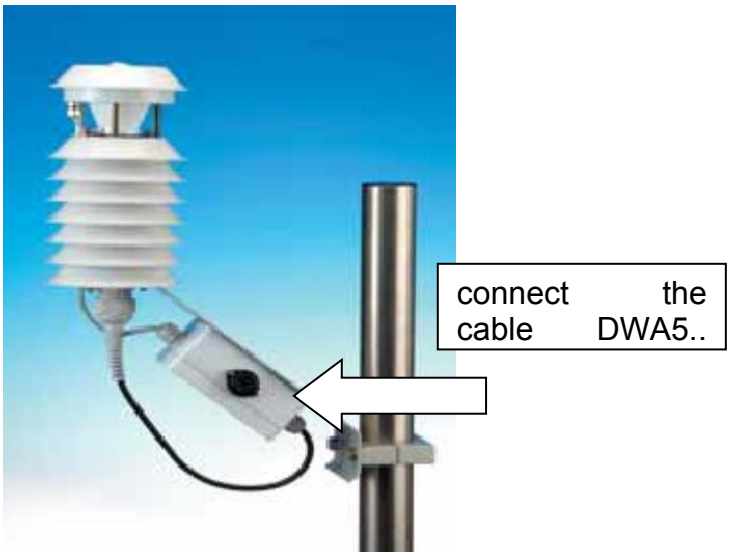
DMA572 with DYA230
Fasten DYA230 to the collar DYA051. Insert DMA572 in the shield from the bottom end tighten the cable glands to fix the sensor in the shield. Connect DMA572 to LSI data logger according to Appendix A and B

DMA572 with DYA231, DYA232

Fasten DYA231, DYA232 to the collar DYA051. Insert in the shield the DMA572 from the bottom end tighten the cable glands to fix the sensor in the shield. Connect DMA572 to LSI data logger. Connect the forced ventilation shield to suitable power supply

DMA575 DMA585 DMA567 DMA569

Attach the instrument to the collar DYA051 and connect the instrument with the cable DWA5.. to proper power supply and signal recording.
Secure the cable along the length of the pole with clips. Tag the cable so that the sensor to which it is connected can be subsequently identified.



5.Application note

5.1.Humidity measurement in very hot weather

In very wet tropical conditions, it is possible for the humidity values to have a low dynamic range near the saturation conditions and, at the same time, to have a low temperature dynamic range and very low wind speed values. In certain periods of the year those conditions are possible for short periods even in mild areas.

In such conditions the hygrocapacitive element can be wet (from the dew) without having the time to dry itself and to restore its measurement capacity. In such case, even if the humidity value decreases, the humidity measurement stands near the saturation value or anyway overestimated. Two conditions are possible. The first is for every type of "exchange type" humidity sensor, the second is typical for capacitive measurement type humidity sensors:

a) The dew layer over the measurement element could be up to 0,25 mm. thick the Penman theory says that n.8 hours are needed to dry this layer (at 30°C, 80 RH% without air speed), or n.4 hours (at 30°C, 60 RH% without air speed). Those period times could be shorter in case of forced ventilation on the humidity measurement element (at least 1,5 m/s);
b) Hygrocapacitive element manufacturers advise that persisting wetness over the element could cause a secondary absorption phenomenon, and a temporary drift of the humidity measurement of about +6%. This error disappears when the element is exposed for some hours at lower humidity values.

Those considerations confirm that the hygrocapacitive measurement element can be used when the humidity values have a sufficient dynamic range, in order to permit the sensor to adjust itself from the "stressed" condition.

6.Testing

6.1.Visual external check

1) Check that the external anti-radiant shield is clean and without bruises;
2) Check that the fan (in the forced ventilation models) runs.

6.2.Visual internal check

1) When the electronic box is open: check that there is no trace of dew inside the box;
2) Pull out the sensor from the shields and:
    a. Check that the porous filter protecting the sensitive elements is clean (see 7.3);
    b. Check that the hygrosensitive element is clean. Use a magnifying glass to check if there is any dust or dew over the capacitive plate. Do not touch the capacitive plate with hands. If necessary, the elements can be cleaned (see 7.2).

6.3.Operational check

1) Measure the ambient temperature and humidity with a reference thermohygrometer.
2) Compare the reference measurement with the probe under testing. Check that the accuracy of the probe under testing is inside its Accuracy range (see 3)

7.Maintenance

7.1.Cleaning of the radiation shield

Clean the external anti-radiant shield with a (tooth)brush.

7.2.Cleaning of the measurement elements

1) Disconnect the cable from the probe
2) Pull out the sensor from the anti-radiant shield by unscrewing the cable glands at the bottom.
3) Unscrew the white porous filter protection.
4) Pass over the Pt100 (temperature measurement element) surface a small very soft brush.
5) Pass over the capacitive plate a very soft brush wetted with distilled water. CAUTION the sensor needs 2-3 hours to measure correctly again. It is possible to accelerate the drying it leaving the element for a few hours in a dry place or to a cold flow exposure.

7.3.Cleaning the porous filter

Clean it using a cold flow spray inside the filter

7.4.Drying the porous filter

Sometimes due to the continuous high humidity values of tropical weather, some wetness could resists around the humidity element inside the porous filter protection. It wears out the capacitive element because the humidity around it is stable at high values even if, after a certain time, the ambient humidity decreases. In this case spray the filter with a cold flow spray.

7.5.Substituting the sensitive element

The procedure to substitute the sensitive element is quite simple.
Appendix F depicts this substitution in details.

- Pull out the sensor from the anti-radiant shield by unscrewing the cable glands at the bottom.
- Unscrew the white porous filter protection
- Unscrew the protection cap as in the picture below
- estract the sensitive element from his site and replace it with a new one (LSI CODE ML3021)

8.Calibration

The calibration procedure is requested only for instruments without plug in sensitive element
This procedure describes the calibration of the humidity element only.
The calibration procedure is carried out using the DSP210 calibration set plus MM1201, MM1202 phials, This calibration is made at two measurement values: 20%RH and 80%RH.
The resulted calibration values are stored in the sensor EEPROM. This procedure is not "follower type"

Calibration procedure

1) Open the elements box. Check that SW1 and SW2 terminals are in "OFF" position.
2) Connect the serial cable to X2 connector and the RS232 PC port .
3) Connect a multimeter (in 20 mA reading mode) to the DWA5.. cable (in the humidity wires output)
4) Turn the sensor power supply on.

On the PC program (AdjTTU)

5) Run the AdjTTU PC program. Select the following Communication options (Parametri):

- Bitrate: 9600 bit
- ID: 2
- Number PC port used: select the one where the serial cable is connected on PC

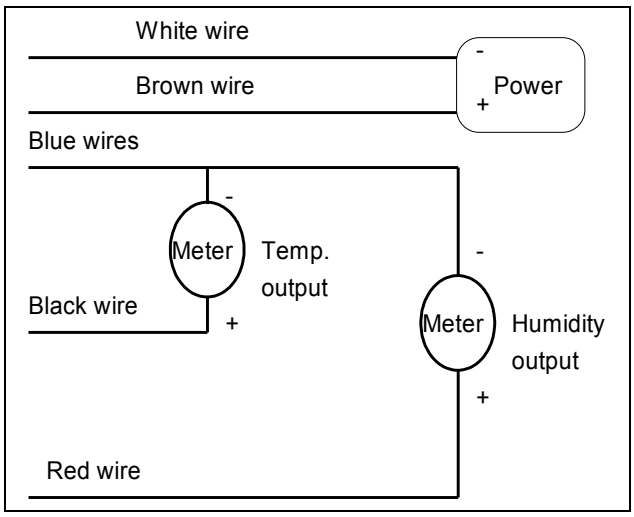
6) Select "Humidity". Follow the suggested procedure: FASE1 and later FASE2. (Note: wait for the require stability time not less than 20-30 minutes)
7) Read on the multimeter the current value and type this value on the "Amperometro" box
8) Select "ACCETTA to confirm and "CHIUDI" to close the calibration procedure
9) Select "AVVIA" to restore the sensor in the measurement mode and to check the correct measurement values.
10) Select "CHIUDI" to finish the calibration

9.Troubleshooting

The troubleshooting procedure is designed to establish if the problem is with the sensor or with the data logger to which it is connected

Test the probe (See dia. below)

a) Disconnect the probe cable from the utility
b) Feed the sensor on the white- and brown+ wires with its power supply
c) Measure a signal between its output range corresponding to a temperature range -30 .. + 70°C on blue- and black+ wires.
d) Measure a signal between its output range corresponding to a humidity range 0 ... 100% on blue- and red+ wires
e) If the result is positive the problem is with the data logger, else the problem is with the probe.



10.Check list Thermo-hygrometers

STATION N°.....

STATION NAME : .....

Description of operational checks	Every 6 Moths	Yearly
Date		
Check by		
- Check the porous filter is clean	X	
- Check mesh of sensitive elements is clean	X	
- Check external anti-radiant shield is clean	X	
- Use a reference thermo-hygrometer to check the result of temperature and humidity	X	
- Check hygro sensitive element is clean	X	
- Calibration of temperature and humidity sensor		X
Remarks :		

Supervised by : ..... date : .....

11.CE Conformity declaration

DICHIARAZIONE DI CONFORMITA' CE

Declaration of Conformity

produttore: LSI – LASTEM SPA
Applicant:

Con la presente si dichiara che tutti i prodotti della seguente serie:
We hereby declare that all the products of the following series:

TermoIgrometro per applicazioni ambientali
TermoIgrometer for environmental applications:

- **DMA567**
- **DMA569**
- **DMA575**
- **DMA585**
- **DME775**
- **DME785**

a cui questa dichiarazione si riferisce è conforme ai requisiti essenziali dei seguenti standard e documenti normativi :
to which this declaration relates, is in conformity with the relevant provisions of the following standard and other normative documents:

EN- 61326 2006 Industrial Location

che rispettano le direttive:
following the provisions of the Directive:

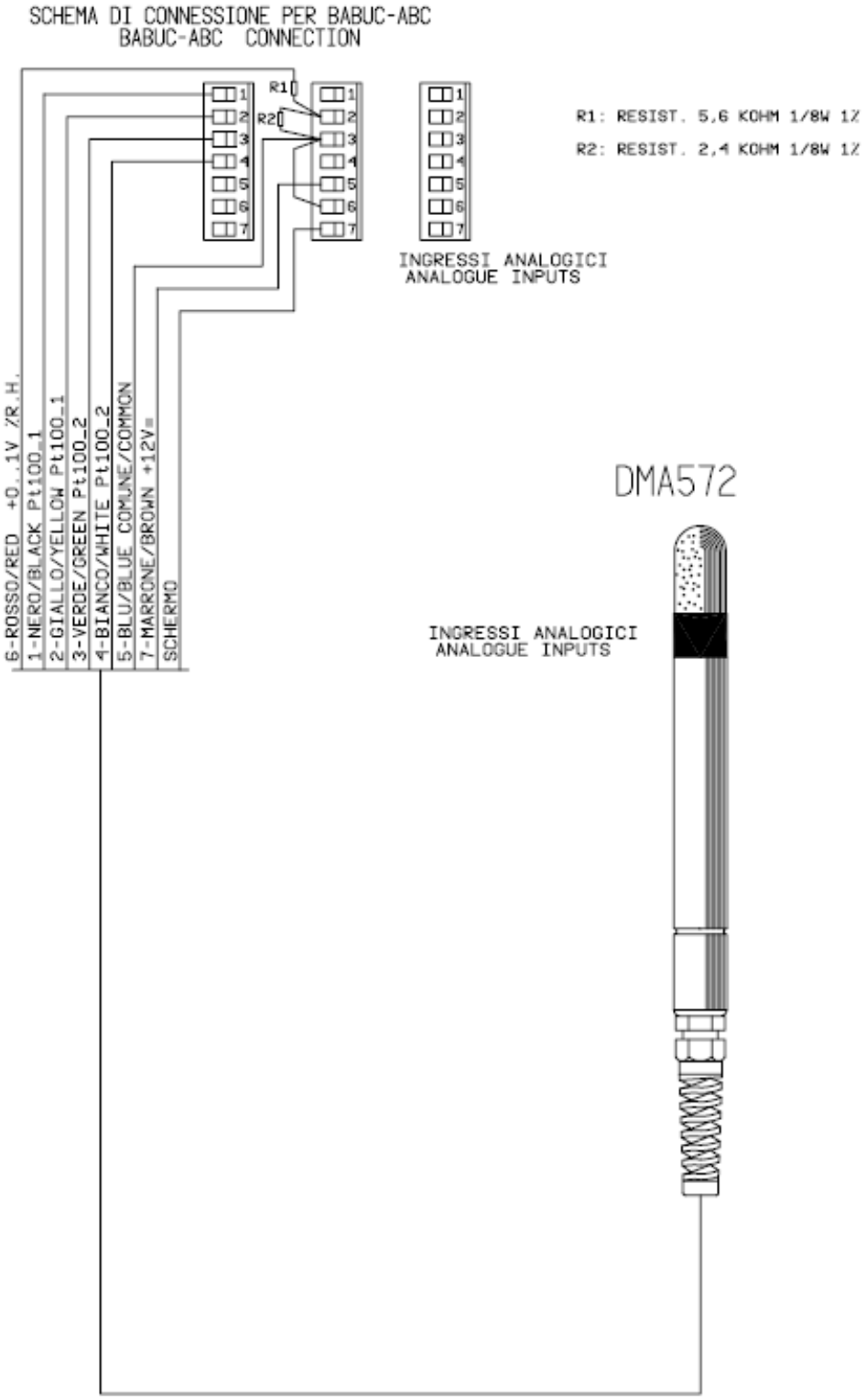
89/336/EEC, 2004/108/CE

Settala, 5 Aprile 2007

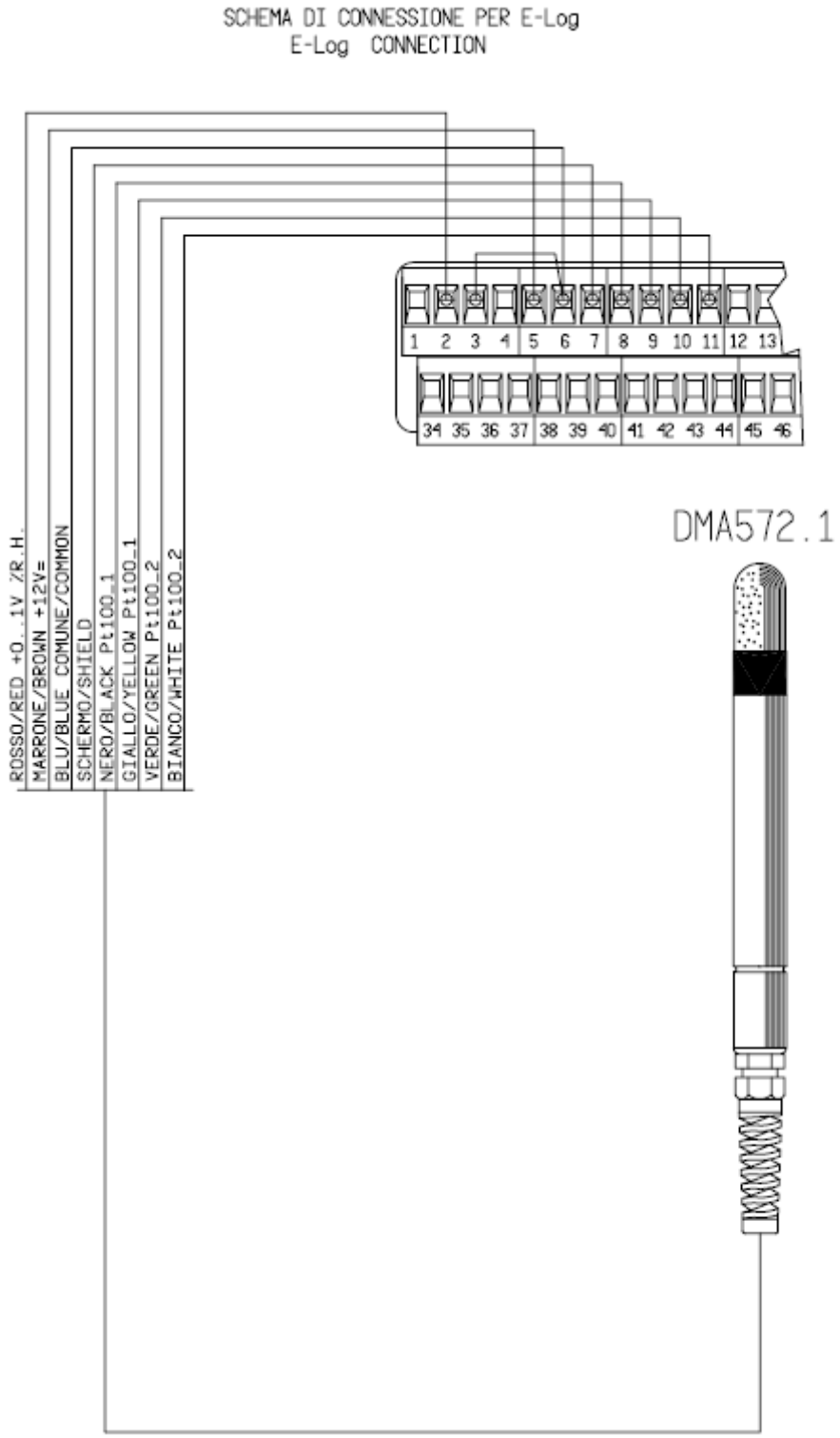
Dr. Giulio Certo
Direttore Generale e Legale Rappresentante

12.Appendix

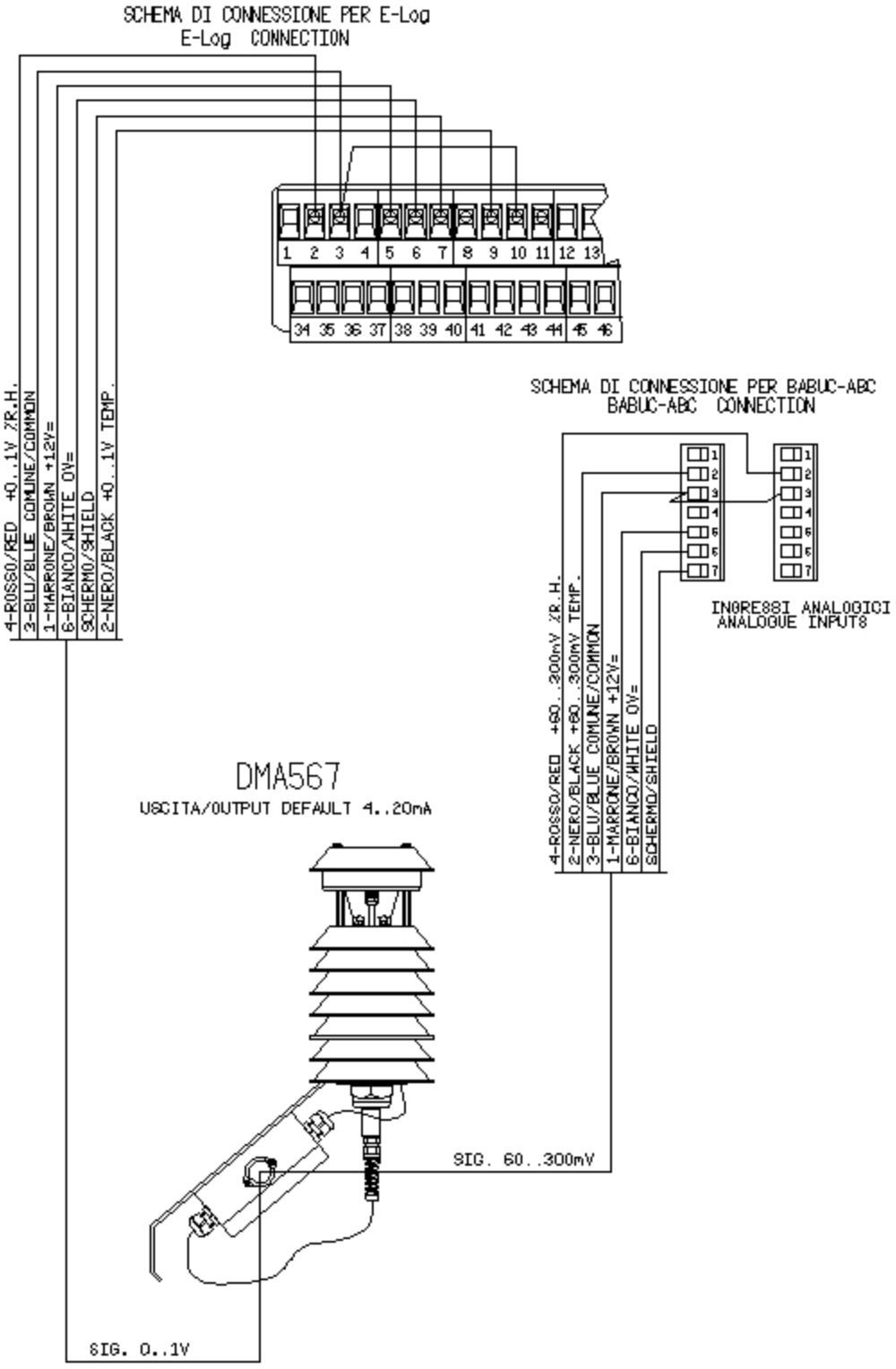
APPENDIX A – Connection od DMA 572 to Babuc ABC



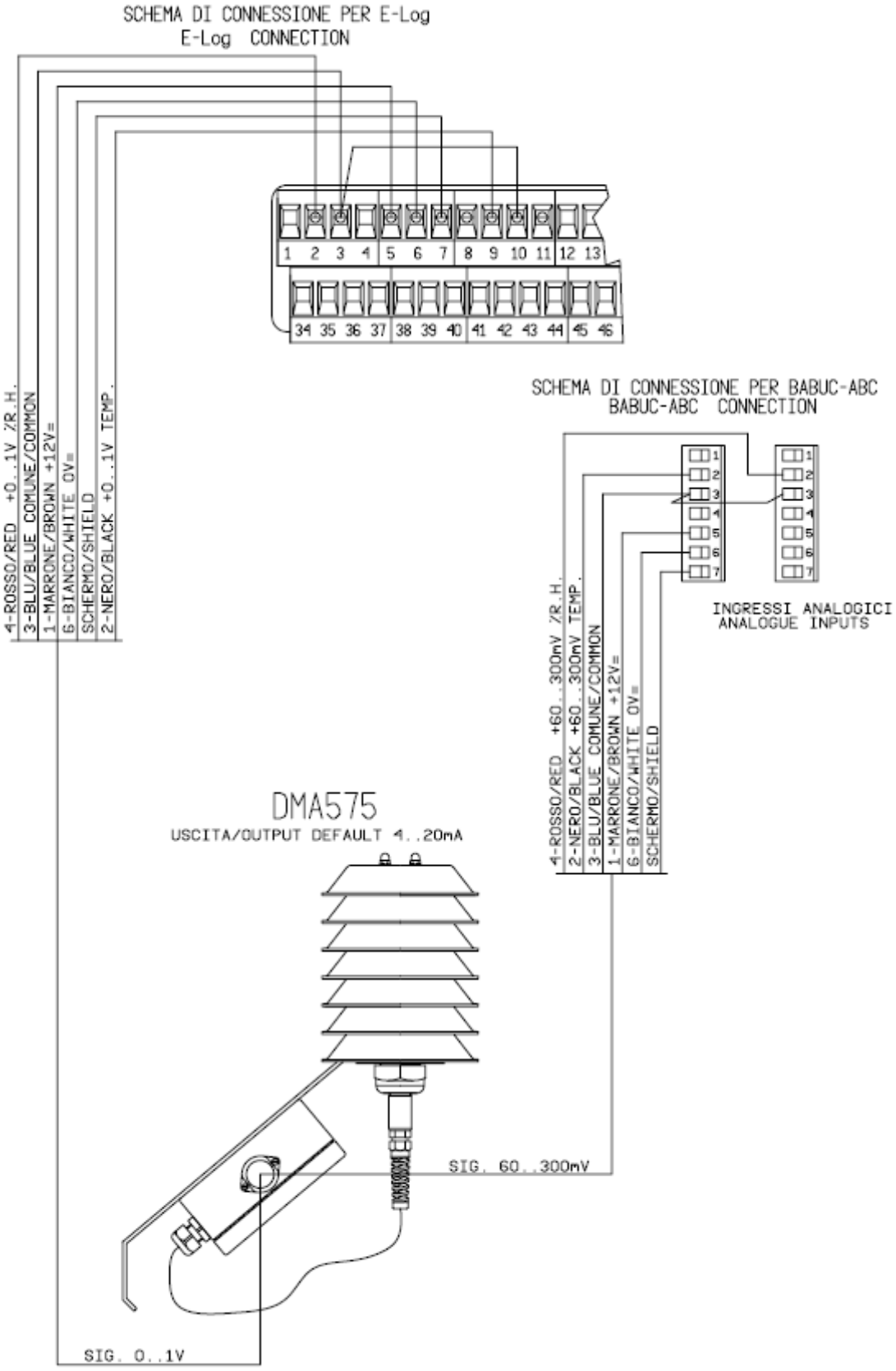
APPENDIX B – Connection od DMA 572.1 to E-Log



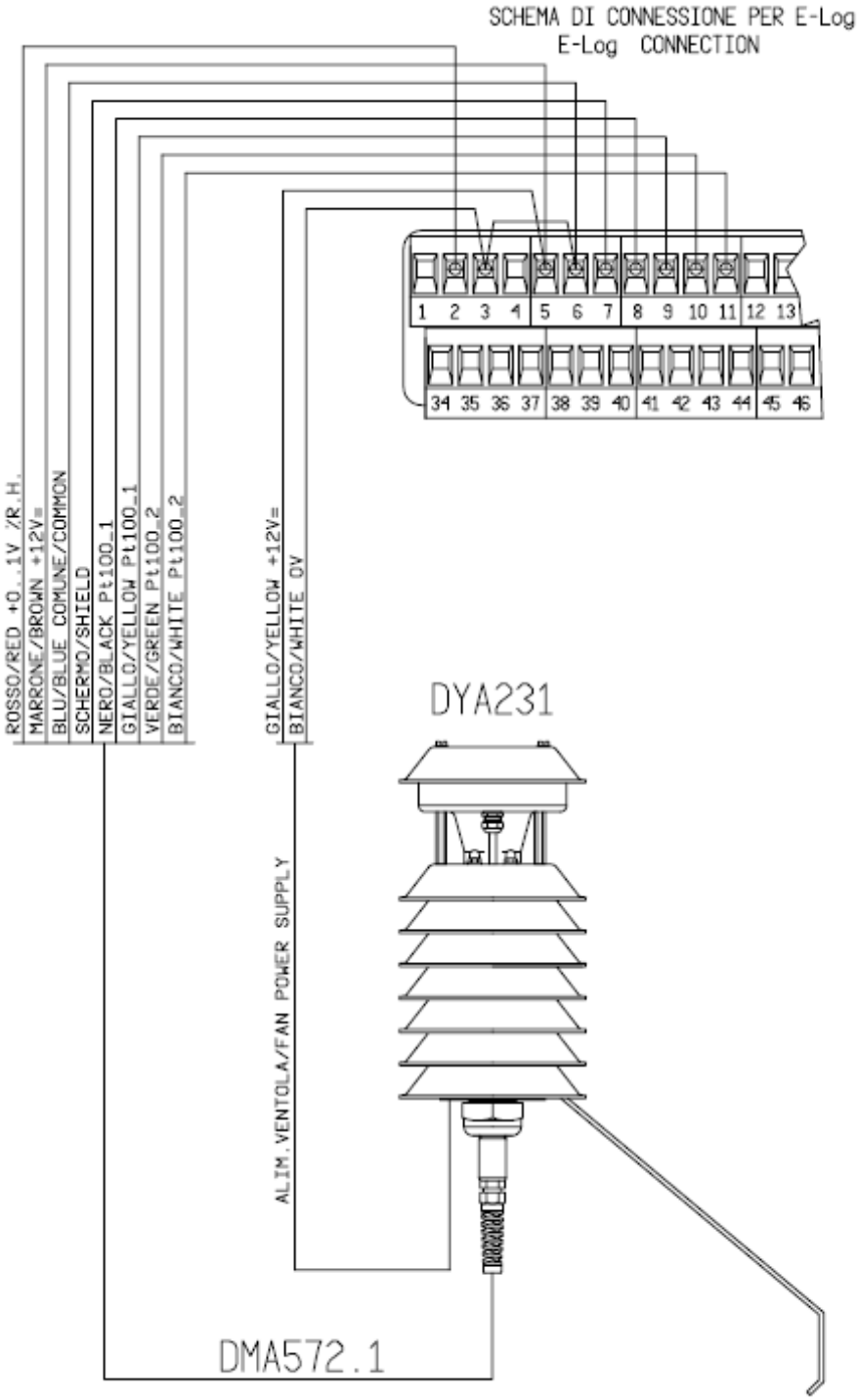
APPENDIX C – Connection od DMA 567 to Babuc ABC and E-Log



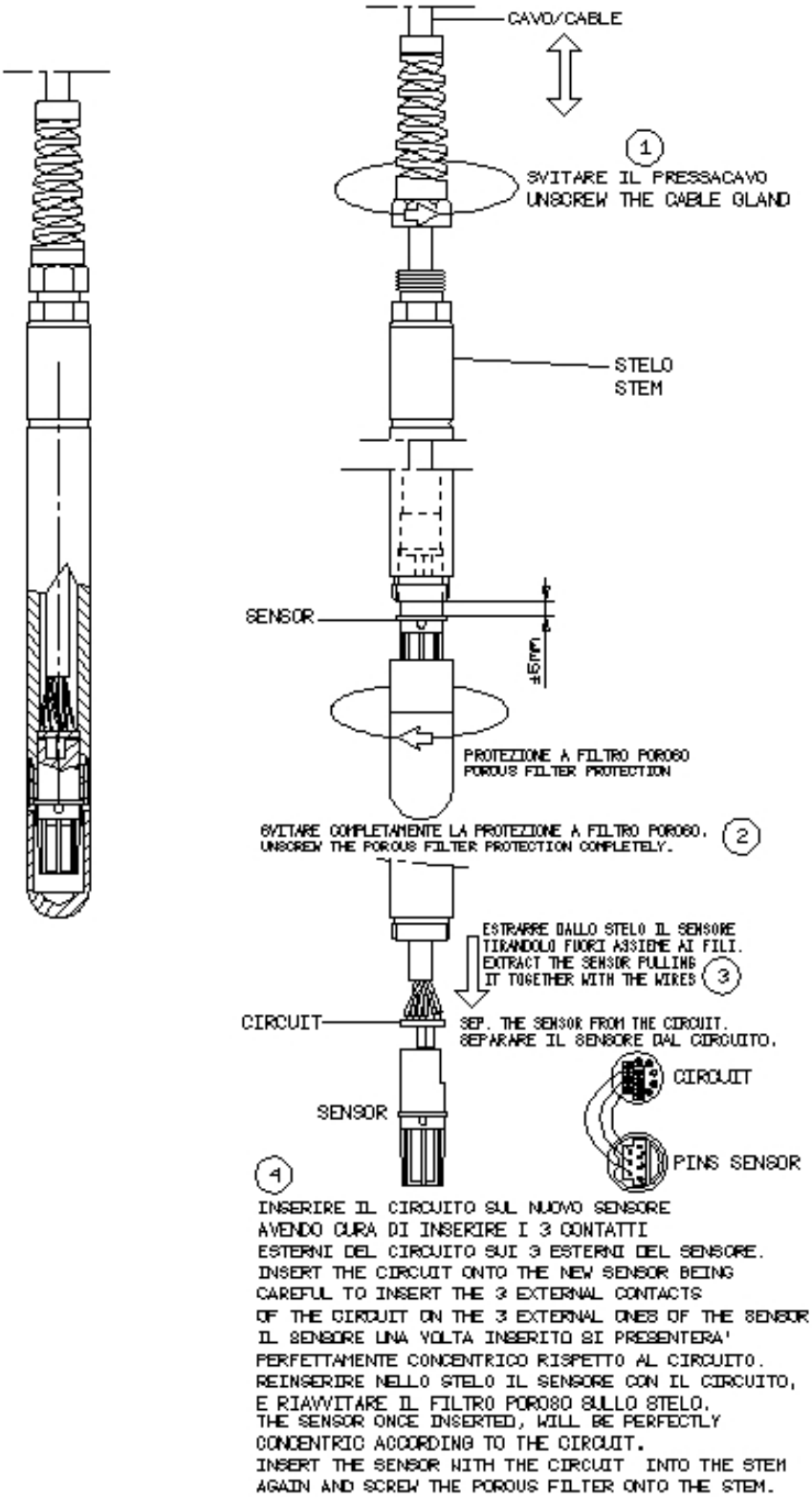
APPENDIX D – Connection of DMA 575, DMA585



Appendix E – Connecion of DMA572.1 with DYA231



Appendix F – Substitution of the sensor element


CAVO/CABLE
1
SVITARE IL PRESSACAVO
UNSCREW THE CABLE GLAND
STELO
STEM
SENSOR
±5mm
PROTEZIONE A FILTRO POROSO
POROUS FILTER PROTECTION
SVITARE COMPLETAMENTE LA PROTEZIONE A FILTRO POROSO.
UNSCREW THE POROUS FILTER PROTECTION COMPLETELY.
2
ESTRARRE DALLO STELO IL SENSORE
TIRANDOLO FUORI ASSIEME AI FILI.
EXTRACT THE SENSOR PULLING
IT TOGETHER WITH THE WIRES
3
CIRCUIT
SEP. THE SENSOR FROM THE CIRCUIT.
SEPARARE IL SENSORE DAL CIRCUITO.
CIRCUIT
SENSOR
PINS SENSOR
4
INSERIRE IL CIRCUITO SUL NUOVO SENSORE
AVENDO CURA DI INSERIRE I 3 CONTATTI
ESTERNI DEL CIRCUITO SUI 3 ESTERNI DEL SENSORE.
INSERT THE CIRCUIT ONTO THE NEW SENSOR BEING
CAREFUL TO INSERT THE 3 EXTERNAL CONTACTS
OF THE CIRCUIT ON THE 3 EXTERNAL ONES OF THE SENSOR
IL SENSORE UNA VOLTA INSERITO SI PRESENTERA'
PERFETTAMENTE CONCENTRICO RISPETTO AL CIRCUITO.
REINSERIRE NELLO STELO IL SENSORE CON IL CIRCUITO,
E RIAVVITARE IL FILTRO POROSO SULLO STELO.
THE SENSOR ONCE INSERTED, WILL BE PERFECTLY
CONCENTRIC ACCORDING TO THE CIRCUIT.
INSERT THE SENSOR WITH THE CIRCUIT INTO THE STEM
AGAIN AND SCREW THE POROUS FILTER ONTO THE STEM.

Appendix G – Electric output switch